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SUERSEN'S

OBTURATORS

THEIR CONSTRUCTION AND USES.

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HELSINGFORS, FINLAND.

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THE CONSTRUCTION OF SUERSEN'S OBTURATORS.

BY DR. TH. WEBER, HELSINGFORS, FINLAND.

It is not the intention of the writer to say much about his own experience in this field of dentistry, but to confine himself chiefly to the work of his esteemed teacher, the Geheimer Hofrath Dr. Wilhelm Suersen, of Berlin, who has done a great deal for the advancement of oral prosthesis, as well as dental science, in Germany. It was a source of regret to find that in this country Suersen's valuable inventions were (with few exceptions) comparatively unknown; I therefore regard it as my duty to him, as well as to the dental profession of this country, to publish his method of constructing obturators. Dr. Suersen is not alone a man of great scientific attainments, but he is also most kind and liberal in the practical application of his knowledge; he is ever willing to impart advice and give information to dental practitioners, whether to him known or unknown. He especially shows his charitable disposition when poor sufferers apply to him for aid in treatment, often supplying them with appliances without remuneration of any kind. It is not, therefore, to be wondered at, that he occupies one of the most prominent positions in the dental profession of Germany. At the meeting of the Central Verein Deutscher Zahnarzte, held at Hamburg, August the 6th, 7th and 8th, 1867 (Deutsch. Vierjahrsschr. f. Zahnheilkunde, 1867, page 269, etc.), Dr. Suersen demonstrated his ingenious method of constructing obturators entirely of hard rubber, to the satisfaction of all the members present.

Palatine defects are either congenital or acquired, and each case of either class requires different treatment. While the acquired lesions only need a perfect fitting apparatus to enable the patient to

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articulate perfectly in a very short space of time, a patient with a congenital defect will need constant instruction in articulation for weeks or months, even with the most perfect appliance that can be made. A patient with a congenital defect, for whom an obturator has just been inserted, is like an infant; he is unable to control his muscles in such a manner as to produce perfect articulate sounds, especially when he is advanced in life. In these cases the patient tries to imitate the sounds of other persons as nearly as possible, thus finally using the muscles of the palate and the tongue in an abnormal way.

Staphylorrhaphic and Urnoplastic operations have never given good results; at least an improvement in articulation has seldom or never been obtained, and they are, therefore, discarded by most modern good surgeons. When a velum has been united by an operation, it generally becomes too short to enable it to come in contact with the superior constrictor muscles of the pharynx, and the nasal passages in relation to speech are in nearly the same condition that they were before the operation.

Although I take it for granted that every one who attempts to restore palatine defects is acquainted with the anatomy and physiology of the parts, I shall briefly refer to some peculiarities of the more important muscles connected with articulation. During articulation the posterior nares are more or less closed by the soft palate, except in the case of the two letters M and N, when the air must pass directly from the larynx through the nose. In the pronunciation of all the other consonants, however, the posterior nares must be closed in such a manner that all the air is obliged to pass through the mouth. The vowels are pronounced in a similar manner, although in distinct articulation some air does pass through the nasal passages, but without producing a nasal sound. The amount of air passing through the nose varies with each of the vowels. In sounding the letter A, for instance, more air passes through the nose than with O or U, and still less with E and I. If, therefore, the nasal passages are stopped up by an inflammation of the Schneiderian membrane, a polypus, or an obturator which extends too high into the nasal cavity, the letters M and N can only be pronounced with great difficulty, and the vowels will be accompanied by a nasal sound.

Articulation, therefore, is produced by a continuous opening and

closing of the nasal passages, through the muscles of the soft palate, together with the superior constrictor of the pharynx. The latter muscle contracts with the pronunciation of every letter, to which fact Dr. Suersen was the first to draw attention, and it is this muscle in particular upon which the whole success of a Suersen's obturator depends.

The elastic artificial vela, invented by Dr. Stern, and afterwards modified by Dr. N. W. Kingsley in such a very ingenious manner, give most beautiful results, but they cannot be employed in every defect. In acquired cases, where the cleft is very wide and the levator and tensor-palati muscles are destroyed, an elastic velum is seldom applicable. Another serious objection to the use of soft rubber in the mouth is its rapid deterioration, thus giving rise to putrefactive changes, which often cause inflammatory reactions in the parts with which they are in contact.

The advantages of Suersen's hard rubber, or metal obturators over others, will be acknowledged by any impartial observer who comprehends the various methods of making them. From Dr. N. W. Kingsley's Oral Deformities, I quote the following:

"The sum of my experience with obturators is this: 1st. That of all obturators this (referring to an obturator constructed entirely of metal) is the best form for a congenital fissure; but while the wearer is enabled to articulate perfectly with such an instrument, it is only after he has learned articulation with another apparatus." "2d. That a soft, elastic artificial velum, is much better adapted to the acquirement of articulation than one of an unyielding, non-elastic substance, but when acquired an obturator may be substituted." "3d. That in very rare cases articulation may be acquired with an obturator only, but it is the result of the extra activity of the pharyngeal muscles, while with the elastic velum the levators of the palate contribute largely."

Although I have the greatest respect for the experience of Dr. N. W. Kingsley, yet I claim that with either a hard rubber or metallic instrument, constructed after Suersen's principles, a patient will learn to articulate just as readily as with an elastic velum. Dr. Kingsley, at the meeting of the First District Dental Society for February, 1885, remarked that no one could construct an obturator for a patient with a congenital cleft, in which articulation was noticeably improved during the first month's wear. At the March

clinic of the same society, I exhibited a patient who had worn a Suersen's apparatus about three weeks, the bulb of which was made of gutta percha, and yet the improvement in articulation was quite perceptible when the patient read with the obturator. Why, then, should we make a patient wear an elastic velum, when articulation can be acquired with a more permanent instrument, which certainly is easier to construct than those of soft rubber, unless the practitioner has a large variety of the various shapes and sizes of metallic moulds from which one could be selected to fit almost any case?

Dr. Suersen, up to May, 1877, had supplied two hundred and forty-three patients with obturators, about two-thirds of whom were congenitally afflicted, and every one, so far as I know, has acquired articulation, and many even to the degree that detection of an imperfection in the vocal organs is impossible. One of these patients was a young man about fourteen years of age, when the obturator was inserted. He afterwards studied theology and became a minister.

A young lady patient, on account of her bad articulation before the insertion of the obturator, was absolutely unintelligible to strangers. She has now become a teacher of the German language, in England.

Another lady, who was engaged to be married, did not tell her intended husband of her infirmity until the day before the marriage, and the gentleman afterwards told Dr. Suersen that he had not, during the time of their engagement, noticed anything abnormal in her speech.

Another young lady, who had been married three years, assured Dr. Suersen that her husband had no knowledge of her wearing an obturator.

None of these patients had ever worn any other apparatus than Suersen's, made entirely of hard rubber, which demonstrates that perfect articulation may be acquired by their use, without the previous wearing of any other apparatus. The construction of these obturators, especially when made entirely of hard rubber, is quite simple, and the first part of it is identical with the making of an ordinary hard rubber plate. A perfect impression should be obtained with plaster of paris. In no instance is it necessary to take it further down than to the anterior border of the soft palate, nor in cases where the hard palate is perforated, higher up than the

floor of the nasal cavities. To prevent the plaster from entering this cavity I pack it full of cotton, previously moistened with a solution of salt water. When this is done, the taking of the impression for an obturator is as simple as for an artificial upper plate.

When a correct plaster model has been obtained, a plate is made with an appendix on its posterior border extending somewhat into the cleft, to which a strong wire loop is attached. (See fig. 1.)

The wire loop upon which the obturator is to be constructed, must not extend further down than the beginning of the uvula. Its direction, when put into the mouth, should be a little above the muscles of the soft palate, in such a manner that when the gutta-percha is applied it will occupy about the centre of the bulb.

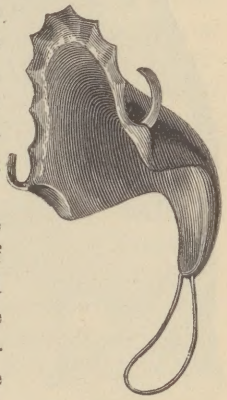

Fig. 1.

If the cleft involves the hard palate, the plate must cover the defect to the lower border of the nasal cavities. The plate should not extend into the nasal cavities, as it may obstruct the free passage of the air through them, in consequence of which the letters M and N would be pronounced indistinctly, and the vowels be accompanied by a nasal sound.

The palate must be held securely in position by at least two well fitting metal clasps, around the molars or bicuspid teeth, if possible. I have constructed one obturator for a patient who had lost all of the teeth from the upper jaw, but I find that it is much more troublesome to become accustomed to an appliance where it cannot be attached to the natural teeth.

When a plate has been constructed as above described, it should be put in the mouth and the patient directed (if time will permit) to wear it for a day. After the plate has been put in position and before the construction of the obturator, we must take care: 1st. That it does not cause pain in any place. 2d. That it does not drop when the wire loop is pressed backwards with the finger. 3d. That the loop occupies its proper position (see fig. 2), after which the construction of the bulb can be commenced.

For this purpose crude gutta-percha has wonderful properties, and is the substance with which Dr. Suersen has achieved his great success in obtaining a correct impression of the muscles of the soft

palate and pharynx during articulation, which method was first described by Dr. S. at the meeting of the *Central Verein Deutscher Zahnarzte*, at Hamburg, in 1867. This gutta-percha, after having been warmed, remains for a few hours soft enough to enable the muscles to imbed themselves in it to great perfection, and without discomfort to the patient. In constructing the bulb, the gutta-percha may be warmed over an alcohol lamp, and moulded around the wire loop. The first day only enough gutta-percha should be applied to barely touch the muscles of the soft palate on either side, and the superior constrictor of the pharynx on the posterior part of the bulb. This first layer of gutta-percha must become perfectly hard before another layer is applied, as the action of the muscles may cause the bulb, when modeled too large at the first sitting, to become loosened from the wire loop. The hardening of the first layer, however, if the time is limited, may be accomplished by cooling the apparatus with ice. The amount of gutta-percha to be applied around the loop depends, of course, upon the width of the cleft. The thickness, however, is somewhat definite.

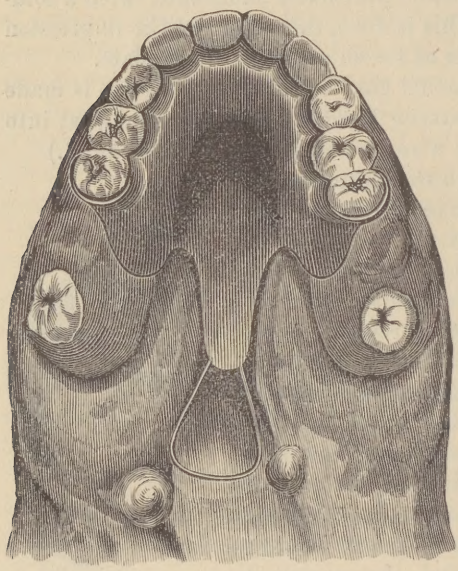

Fig. 2.

Until a few months ago Dr. Suersen, as well as the writer, had made these obturators thick and large, measuring on their posterior part from three-quarters to one inch in thickness, and this, on account of the weight and expansion of the rubber, made it necessary to vulcanize them hollow. While in this country, I have made experiments which have demonstrated that an obturator that is one-eighth of an inch in thickness in its middle part, and three-eighths of an inch high around the borders which are in con-

tact with the muscles, will give the same result as a very thick apparatus. The size of the gutta-percha modeled around the wire loop should, therefore, if a thin obturator is to be made, not exceed one-half an inch in thickness.

When the first portion of the gutta-percha has become hard, another layer may be added, but before this is done it must be carefully dried with a towel and touched with a hot knife. The gutta-percha to be added must be warmed over an alcohol lamp, and with a hot knife modeled into the desired form. If any gutta-percha is to be cut away at any time, the knife must be made sufficiently hot so that it will cut without much pressure. Whenever any gutta-percha has been added to the bulb, as soon as the apparatus has been replaced in the mouth the patient should be directed to swallow, and then read a few lines, or pronounce some letter of the alphabet. Whenever the gutta-percha is in contact with the muscles of the soft palate or pharynx for a few hours, it is marked by them as a polished surface. When, therefore, an obturator has been in position some hours, the places where it is in contact with the muscles may be easily recognized. A rough depression always signifies insufficiency of material. In those places more gutta-percha should be added, until all surfaces which lie in contact with the muscles of the soft palate and pharynx are perfectly smooth.

The lingual surface of a Suersen obturator should be in about the same line as the velum when elevated by the levator palati. The posterior wall of the bulb should always be made to come in contact with the superior constrictor of the pharynx, in that place in which this muscle shows its greatest constriction when the letter A is pronounced. When the apparatus is too long, it is the cause of nausea, and is an obstruction in deglutition; if it is too short, the letters G and K cannot be pronounced perfectly.

In the middle line of the posterior border I have found some advantage in adopting the idea of Dr. Bishop, which consists in forming an imitation of the uvula, as this enables us to make a corresponding excavation at the upper border of the posterior surface, thereby enabling the secretions which collect in the upper surface of the bulb to flow off freely. During articulation the soft palate is continually elevated. It is, therefore, advisable to assure an absolutely tight fit, and the upper border of the lateral walls, which are in contact with the muscles of the soft palate, should be directed a

little outwards. For this purpose the bulb across the lingual (lower) surface should be a little narrower than at the same point at the nasal (upper) surface. The posterior surface of the bulb differs in form in almost every case. On the lingual border, about the median line, where the uvula is situated, the upper border should be scalloped out to correspond with the condition presented.

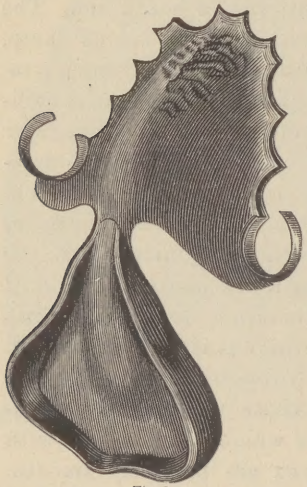

Fig. 3.

The superior surface should be concave, as represented in fig. 3. To assure a perfect adaptation it is best, even when all these surfaces have been worn perfectly smooth, to add a very thin layer of gutta-percha all around the bulb, and then let the patient wear the apparatus for a few days longer. But it should be carefully observed that the posterior wall of the bulb does not extend higher up than the point where the greatest contraction of the superior constrictor muscle is noticeable. In such an instance the pronunciation of the word "mamma" will sound "baba," and the patient will not be able to breathe nor blow freely through the nose. Whenever we have added too much gutta-percha, the bulb should be carefully warmed and the obturator replaced in the mouth. If now the patient is directed to swallow, then blow his nose, and then read a few lines, we will find that the muscles have pushed away the excess of material, which afterwards may be trimmed off with a hot knife. When we are satisfied with the adaptation and position of the obturator, and we are certain that no more alterations are necessary, the gutta-percha bulb may be replaced by either hard rubber or metal. Before placing the obturator in the flask, it is better to secure a correct mould of the same in plaster, that in case anything should happen to the bulb it may not be necessary to commence again with the construction of a new bulb in gutta-percha. This mould must be made out of as many sections as necessary, that the obturator may be removed from the mould with ease. When the obturator has been carefully removed from the sectional mould, it is invested, with the lingual surface downward, in the lower part

of a large rubber flask. The gutta-percha bulb should be set into the plaster in such a manner that only its superior surface is exposed. (The plaster in the lower part of the flask should cover every surface of the gutta-percha bulb which has been in contact with any of the muscles of the mouth.) When the plaster is thoroughly hard, and before that for the upper part of the flask is to be poured, the lower part of the flask is put in warm water, of a temperature not higher than 125° F., when all the gutta-percha is to be very carefully removed out of the flask with an instrument. After the gutta-percha has been taken out, the wire loop and the hard rubber appendix should be washed with chloroform, until every trace of gutta-percha is removed. When the chloroform has been allowed to evaporate, we cover the matrix, out of which we have removed the gutta-percha, with a layer of sheet wax, about as thick as we desire to make the bulb of rubber, which need not be thicker than about one-eighth of an inch in any place. The upper part of the flask may then be adjusted upon the lower one thus prepared, and the plaster poured into it, and further manipulated like an ordinary rubber plate.

In finishing the hard rubber bulb, great care should be taken not to touch the sides which lie in contact with the muscles of the soft palate and pharynx with the file, sand-paper, or anything that may remove the contours made by these muscles. All edges, as well as the lingual (lower) and the nasal (upper) surfaces, should be carefully smoothed and polished.

When the obturator is to be made entirely of metal, the plate covering the hard palate with the appendix and wire loop has to be constructed first, as in the case when a rubber plate is desired, when the gutta-percha bulb is moulded in the manner as mentioned above. When the bulb has been constructed, the obturator is imbedded in plaster with the lingual surface downwards, in sections, as mentioned before, the upper surface being left free. When the plaster is perfectly hard the obturator is removed, the sections put together, and thoroughly soaked with a solution of soap in alcohol. This matrix is then filled two or three times, according to the number of metal casts desired, with a mixture of sand and plaster. These pieces of sand and plaster, when removed from the matrix, represent an exact duplicate of the gutta-percha bulb, and are to be fastened upon another large, flat piece of sand and plaster, and grad-

ually but thoroughly dried. When perfectly dry, a strong iron casting-ring, with its widest side downwards, is placed over one of them, and surrounded with casting sand. Into this mould we pour either zinc, type, or Spence-metal, which will give us an exact duplicate of the sectional plaster matrix.

The metal matrix, when cold, is to be removed from the iron ring, and if the edges are much overhanging, the matrix should be sawed about half way through in two or three places, and then broken. This broken matrix, now being an imitation of the sectional plaster one, is then fitted back again into the strong iron casting-ring, into which the metal bulb is to be shaped. The metal best adapted for this purpose is thin, twenty-two carat gold plate, subsequently stiffened by lining it with platinum wire gauze, and then by blowing eighteen carat gold solder over that. When the bulb has been shaped perfectly, it is attached to the appendix of the gold plate in exactly the same position formerly occupied by the gutta-percha, which may be determined by placing both the plate and the bulb in the first sectional plaster mould. When the bulb has been securely soldered to the appendix of the plate, the missing lower (lingual) or upper plate (according to which side was superior when the bulb was struck up) is to be attached. In soldering the upper or lower surface upon the bulb, care should be taken to make a small hole into one of the surfaces for the escape of the air while soldering, which afterwards may be closed by a screw, or by soft solder. The obturator is then, after it has been carefully finished and polished, ready for use.

When these instruments have been carefully constructed in the manner mentioned above, they will give satisfaction in every case, although a great deal of the success depends upon the intelligence and the persistence of the patient. With an acquired lesion there will be very little trouble. The patient has already been taught to articulate, therefore, as soon as the lesion is repaired perfectly, in the majority of cases they can articulate as perfectly as before the perforation of the soft palate. With a congenital defect, on the contrary, the success is never as rapid, for, as mentioned before, these patients do not know how to use the muscles of the tongue, soft palate, and pharynx correctly, to produce perfect articulating sounds. The most difficult letters for such patients to pronounce are S, R, G and T, in combination with other letters, as Sister, Reap-

ing, Coming, Going, Teething, etc., and however perfect the obturator has been constructed, the patient will be unable to acquire articulation without teaching. We should, therefore, see such patients frequently, hear them read slowly, and correct every mistake, by explaining to them what position they should give to the muscles of the tongue to overcome these difficulties; and as daily instruction will be necessary, it will be desirable to have friends of the patient present, that they may become acquainted with the manner of correcting mistakes in articulation.